CLAIMS

1. An alkali-soluble silicon-containing polymer which is represented by the general formula (1) below and has a weight-average molecular weight in the range from 500 to 500,000:

$$[A^1\text{-}(R^1)_m\text{-}Si\text{-}O_{3/2}]_s[R^2\text{-}\underset{\displaystyle R^2}{\overset{\displaystyle R^2}{Si}}\text{-}O_{1/2}]_t[Si\text{-}O_{4/2}]_u \qquad (1)$$

(In the formula, A^1 is a phenyl group having either a hydroxyl group or an alkoxy group; R^1 is an alkylene group of 1-4 carbons; m is 0 or 1; R^2 is an alkyl group of 1-4 carbons (R^2 in one molecule may be the same type or a combination of two or more different types.); each of s and u is a positive number; t is 0 or a positive number; $0 \leq t/(s + u) \leq 1$; and $0 < u/s \leq 5$).

2. The alkali-soluble silicon-containing polymer according to Claim 1, wherein $0 \leq t/(s + u) \leq 0.2$ and $0.2 < u/s \leq 5$ are in the general formula (1) and said polymer is solid at room temperature.

3. A method for manufacturing the alkali-soluble silicon-containing polymer represented by the general formula (1) above, being characterized in performing hydrolytic co-condensation of s moles of an organosilane having a hydrolysable group represented by the general formula (2) below, t moles of an organosilane having a hydrolysable group represented by the general formula (3) below, and u moles of a silicon compound having a hydrolysable group represented by the general formula (4) below (wherein s and u are positive numbers; t is 0 or a positive number; $0 \leq t/(s + u) \leq 1$; and $0 < u/s \leq 5$).

$$A^1\ (R^1)_m\ Si\ M^1_3 \qquad (2)$$

(In the formula, A^1 is a phenyl group having either a hydroxyl group or an alkoxy group; R^1 is an alkylene group of 1-4 carbons; M^1 is a hydrolysable group; and m is 0 or 1.)

$$R^2\text{-}\underset{\displaystyle R^2}{\overset{\displaystyle R^2}{Si}}\text{-}M^2 \qquad (3)$$

(In the formula, R^2 is an alkyl group of 1-4 carbons; and M^2 is a hydrolysable group.)

$$SiM^3_4 \qquad (4)$$

(In the formula, M^3 is a hydrolysable group.)

4. A silicon-containing polymer which is represented by the general formula (5) below and has a weight-average molecular weight in the range from 500 to 500,000:

$$[Si\text{-}O_{4/2}]_w[H\text{-}Si\text{-}O_{3/2}]_x[A^2\text{-}(R^3)_n\text{-}Si\text{-}O_{3/2}]_y[R^4\text{-}\underset{\displaystyle R^4}{\overset{\displaystyle R^4}{Si}}\text{-}O_{1/2}]_z \qquad (5)$$

(In the formula, A^2 is an organic group of 2-10 carbons, having a carbon-carbon unsaturated group; R^3 is an alkylene group of 1-20 carbons, a bivalent aromatic group of 6-20 carbons, or a bivalent alicyclic group of 3-20 carbons; n is 0 or 1; R^4 is a hydrogen atom or an alkyl group of 1-10 carbons (R^4 in one molecule may be the same type or a combination of two or more different types.); each of x and y is a positive number; each of w and z is 0 or a positive number; $0 \leq z/(w + x + y) \leq 2$; and $0.01 \leq y/(w + x) \leq 5$).

5. A heat-resistant resin composition comprising a hydrosilylated polymer obtained by a reaction between a hydrogen atom bonded to a silicon atom in the silicon-containing polymer according to Claim 4, and a carbon-carbon unsaturated group in another silicon-containing polymer according to Claim 4.

6. The heat-resistant resin composition according to Claim 5, having a weight loss rate of 5% or less when heated from 25°C to 1,000°C at a rate of temperature increase of 10°C/minute in nitrogen atmosphere.

7. A heat-resistant film, which is obtained by spreading an organic solvent solution of the silicon-containing polymer according to Claim 4 on a substrate and curing the coated film by thermal hydrosilylation.